

Appendix Table 1. Association of Post-Discharge Health Services Utilization within 7, 14, and 30 Days of Discharge from Index Admission with Unplanned 30-Day Readmission

	7-day post- discharge services OR (95% CI)	14-day post- discharge services OR (95% CI)	30-day post- discharge services OR (95% CI)
<b>A. All index admission patients (n = 583,199)</b>			
Institutional outpatient	0.74 (0.72, 0.75)	0.60 (0.58, 0.61)	0.40 (0.39, 0.41)
Office-based primary care physician	0.97 (0.95, 0.99)	0.86 (0.85, 0.88)	0.70 (0.69, 0.72)
Office-based specialist	1.22 (1.20, 1.25)	1.06 (1.04, 1.08)	0.77 (0.75, 0.79)
Office-based non-physician provider	0.97 (0.95, 0.99)	0.83 (0.82, 0.85)	0.72 (0.70, 0.74)
Emergency department	3.14 (3.02, 3.27)	3.70 (3.57, 3.84)	4.41 (4.26, 4.56)
Home health care	0.82 (0.79, 0.84)	0.79 (0.77, 0.82)	0.63 (0.61, 0.64)
Skilled nursing facility	1.00 (0.96, 1.05)	1.00 (0.96, 1.04)	1.04 (1.00, 1.09)
<b>B. Patients admitted for six conditions under the Hospital Readmission Reduction Program (n = 70,696)</b>			
Institutional outpatient	0.71 (0.67, 0.75)	0.56 (0.53, 0.59)	0.38 (0.36, 0.40)
Office-based primary care physician	0.98 (0.94, 1.03)	0.85 (0.81, 0.89)	0.65 (0.61, 0.68)
Office-based specialist	1.09 (1.04, 1.14)	0.95 (0.90, 1.00)	0.67 (0.63, 0.71)
Office-based non-physician provider	0.88 (0.84, 0.92)	0.74 (0.71, 0.78)	0.69 (0.66, 0.73)
Emergency department	3.09 (2.83, 3.36)	3.72 (3.46, 4.00)	4.22 (3.96, 4.49)
Home health care	0.89 (0.83, 0.96)	0.89 (0.83, 0.95)	0.73 (0.68, 0.78)
Skilled nursing facility	0.84 (0.75, 0.95)	0.83 (0.74, 0.94)	0.85 (0.75, 0.96)

Notes:

(i) In multivariable logistic models, odds ratio (OR) and 95% confidence interval (CI) were adjusted for all other explanatory variables listed in Table 2 as well as the variables listed in this table. Adjustment for the twenty most frequent index admission diagnoses was performed for all index admission patients only.

Appendix Table 2. Association of Post-Discharge Health Services Utilization within 7, 14, and 30 Days of Discharge with 30-Day Readmission Hospital Length of Stay

	7-day post- discharge services APO/AME (95% CI)	14-day post- discharge services APO/AME (95% CI)	30-day post- discharge services APO/AME (95% CI)
<b>A. All index admission patients (n = 583,199)</b>			
Institutional outpatient			
Adjusted predicted LOS with no visit	0.71 (0.70, 0.72)	0.76 (0.75, 0.78)	0.89 (0.88, 0.91)
Adjusted predicted LOS with visit	0.56 (0.54, 0.57)	0.51 (0.50, 0.52)	0.44 (0.43, 0.45)
AME	-0.15 (-0.17, -0.14)	-0.26 (-0.27, -0.24)	-0.46 (-0.48, -0.44)
Office-based primary care physician			
Adjusted predicted LOS with no visit	0.69 (0.67, 0.70)	0.74 (0.73, 0.76)	0.85 (0.83, 0.87)
Adjusted predicted LOS with visit	0.65 (0.64, 0.66)	0.63 (0.62, 0.64)	0.59 (0.59, 0.60)
AME	-0.04 (-0.05, -0.02)	-0.12 (-0.13, -0.10)	-0.26 (-0.28, -0.24)
Office-based specialist			
Adjusted predicted LOS with no visit	0.61 (0.60, 0.62)	0.65 (0.64, 0.66)	0.79 (0.78, 0.81)
Adjusted predicted LOS with visit	0.73 (0.72, 0.74)	0.68 (0.66, 0.69)	0.61 (0.60, 0.62)
AME	0.12 (0.10, 0.13)	0.02 (0.01, 0.04)	-0.18 (-0.20, -0.16)
Office-based non-physician provider			
Adjusted predicted LOS with no visit	0.67 (0.66, 0.68)	0.69 (0.68, 0.70)	0.72 (0.71, 0.73)
Adjusted predicted LOS with visit	0.64 (0.62, 0.66)	0.60 (0.59, 0.62)	0.54 (0.53, 0.55)
AME	-0.02 (-0.05, 0.01)	-0.09 (-0.10, -0.07)	-0.18 (-0.20, -0.17)
Emergency department			
Adjusted predicted LOS with no visit	0.63 (0.62, 0.64)	0.60 (0.59, 0.61)	0.57 (0.56, 0.58)
Adjusted predicted LOS with visit	1.44 (1.38, 1.49)	1.52 (1.48, 1.57)	1.54 (1.50, 1.58)
AME	0.81 (0.76, 0.86)	0.92 (0.87, 0.97)	0.97 (0.93, 1.01)
Home health care			
Adjusted predicted LOS with no visit	0.69 (0.68, 0.70)	0.69 (0.68, 0.70)	0.73 (0.72, 0.74)
Adjusted predicted LOS with visit	0.57 (0.55, 0.59)	0.56 (0.54, 0.58)	0.48 (0.47, 0.50)
AME	-0.11 (-0.14, -0.09)	-0.13 (-0.15, -0.11)	-0.24 (-0.26, -0.23)
Skilled nursing facility			
Adjusted predicted LOS with no visit	0.67 (0.65, 0.68)	0.66 (0.65, 0.68)	0.66 (0.64, 0.67)
Adjusted predicted LOS with visit	0.67 (0.64, 0.69)	0.67 (0.65, 0.70)	0.69 (0.66, 0.71)
AME	0.00 (-0.03, 0.03)	0.01 (-0.02, 0.04)	0.03 (0.00, 0.06)
<b>B. Patients admitted for six conditions under the Hospital Readmission Reduction Program (n = 70,696)</b>			
Institutional outpatient			
Adjusted predicted LOS with no visit	0.90 (0.87, 0.92)	0.98 (0.95, 1.01)	1.15 (1.11, 1.19)
Adjusted predicted LOS with visit	0.69 (0.66, 0.73)	0.63 (0.60, 0.66)	0.55 (0.52, 0.57)
AME	-0.20 (-0.25, -0.16)	-0.35 (-0.40, -0.31)	-0.60 (-0.65, -0.55)
Office-based primary care physician			
Adjusted predicted LOS with no visit	0.85 (0.82, 0.89)	0.93 (0.89, 0.97)	1.10 (1.05, 1.15)
Adjusted predicted LOS with visit	0.83 (0.80, 0.85)	0.79 (0.77, 0.82)	0.75 (0.72, 0.77)
AME	-0.03 (-0.07, 0.02)	-0.14 (-0.19, -0.09)	-0.35 (-0.40, -0.29)
Office-based specialist			
Adjusted predicted LOS with no visit	0.81 (0.78, 0.84)	0.87 (0.84, 0.91)	1.10 (1.05, 1.15)
Adjusted predicted LOS with visit	0.86 (0.83, 0.89)	0.82 (0.79, 0.84)	0.75 (0.73, 0.77)
AME	0.05 (0.01, 0.10)	-0.06 (-0.10, -0.01)	-0.35 (-0.41, -0.29)

Office-based non-physician provider			
Adjusted predicted LOS with no visit	0.86 (0.83, 0.88)	0.87 (0.85, 0.90)	0.91 (0.88, 0.94)
Adjusted predicted LOS with visit	0.75 (0.70, 0.79)	0.72 (0.68, 0.76)	0.66 (0.63, 0.70)
AME	-0.11 (-0.16, -0.05)	-0.15 (-0.20, -0.10)	-0.25 (-0.29, -0.20)
Emergency department			
Adjusted predicted LOS with no visit	0.79 (0.77, 0.81)	0.76 (0.74, 0.78)	0.73 (0.70, 0.75)
Adjusted predicted LOS with visit	1.78 (1.64, 1.93)	1.87 (1.75, 1.99)	1.78 (1.69, 1.87)
AME	0.99 (0.85, 1.14)	1.11 (0.99, 1.23)	1.05 (0.96, 1.14)
Home health care			
Adjusted predicted LOS with no visit	0.86 (0.83, 0.89)	0.87 (0.84, 0.89)	0.90 (0.88, 0.93)
Adjusted predicted LOS with visit	0.74 (0.68, 0.79)	0.74 (0.69, 0.78)	0.66 (0.62, 0.70)
AME	-0.13 (-0.19, -0.06)	-0.13 (-0.19, -0.07)	-0.24 (-0.29, -0.19)
Skilled nursing facility			
Adjusted predicted LOS with no visit	0.87 (0.83, 0.90)	0.87 (0.83, 0.90)	0.86 (0.83, 0.90)
Adjusted predicted LOS with visit	0.75 (0.67, 0.83)	0.75 (0.67, 0.83)	0.76 (0.68, 0.83)
AME	-0.11 (-0.22, 0.00)	-0.12 (-0.22, -0.01)	-0.11 (-0.21, -0.01)

Notes:

- (i) In multivariable two-part models, adjusted predicted outcome (APO; in days), average marginal effect (AME; in days) and 95% confidence interval (CI) were adjusted for all other explanatory variables listed in Table 2 as well as the variables listed in this table. Adjustment for the twenty most frequent index admission diagnoses was performed for all index admission patients only.
- (ii) The AME represents the difference in APO (i.e., 30-day readmission hospital length of stay per IA discharge) between patients who did and did not utilize each post-discharge service.
- (iii)  $p < 0.05$  if 95% CI does not include zero.

Appendix Table 3. Association of Post-Discharge Health Services Utilization within 7, 14, and 30 Days of Discharge with 30-Day Readmission Inpatient Costs

	7-day post- discharge services APO/AME (95% CI)	14-day post- discharge services APO/AME (95% CI)	30-day post- discharge services APO/AME (95% CI)
<b>A. All index admission patients (n = 583,199)</b>			
Institutional outpatient			
Adjusted predicted cost with no visit	5961 (5742, 6180)	6460 (6215, 6705)	7595 (7303, 7888)
Adjusted predicted cost with visit	4617 (4423, 4811)	4213 (4047, 4380)	3618 (3476, 3761)
AME	-1345 (-1516, -1173)	-2246 (-2429, -2064)	-3977 (-4203, -3750)
Office-based primary care physician			
Adjusted predicted cost with no visit	5760 (5521, 5998)	6226 (5963, 6490)	7102 (6799, 7406)
Adjusted predicted cost with visit	5466 (5272, 5661)	5252 (5064, 5441)	4984 (4804, 5163)
AME	-293 (-457, -130)	-974 (-1157, -791)	-2119 (-2329, -1908)
Office-based specialist			
Adjusted predicted cost with no visit	4710 (4544, 4876)	4927 (4745, 5108)	5928 (5698, 6158)
Adjusted predicted cost with visit	6539 (6276, 6803)	6025 (5792, 6259)	5437 (5228, 5645)
AME	1829 (1648, 2011)	1099 (934, 1263)	-492 (-674, -309)
Office-based non-physician provider			
Adjusted predicted cost with no visit	5603 (5403, 5803)	5781 (5573, 5989)	6075 (5854, 6297)
Adjusted predicted cost with visit	5558 (5316, 5800)	5006 (4781, 5231)	4446 (4252, 4640)
AME	-45 (-216, 126)	-775 (-952, -598)	-1630 (-1797, -1462)
Emergency department			
Adjusted predicted cost with no visit	5304 (5115, 5493)	5100 (4919, 5282)	4832 (4658, 5006)
Adjusted predicted cost with visit	11188 (10559, 11816)	12063 (11456, 12671)	12439 (11870, 13009)
AME	5884 (5331, 6437)	6963 (6448, 7477)	7607 (7135, 8079)
Home health care			
Adjusted predicted cost with no visit	5774 (5563, 5984)	5845 (5630, 6059)	6163 (5936, 6391)
Adjusted predicted cost with visit	4725 (4488, 4963)	4588 (4369, 4807)	3936 (3753, 4119)
AME	-1048 (-1266, -830)	-1257 (-1458, -1056)	-2227 (-2410, -2044)
Skilled nursing facility			
Adjusted predicted cost with no visit	5575 (5352, 5798)	5572 (5349, 5795)	5537 (5318, 5756)
Adjusted predicted cost with visit	5631 (5316, 5945)	5640 (5328, 5952)	5729 (5414, 6045)
AME	55 (-291, 402)	68 (-275, 411)	192 (-144, 528)
<b>B. Patients admitted for six conditions under the Hospital Readmission Reduction Program (n = 70,696)</b>			
Institutional outpatient			
Adjusted predicted cost with no visit	7637 (7240, 8034)	8352 (7901, 8803)	9838 (9314, 10363)
Adjusted predicted cost with visit	5777 (5344, 6211)	5289 (4935, 5643)	4611 (4315, 4908)
AME	-1860 (-2349, -1371)	-3063 (-3536, -2590)	-5227 (-5727, -4727)
Office-based primary care physician			
Adjusted predicted cost with no visit	7208 (6744, 7673)	7895 (7370, 8421)	9320 (8682, 9958)
Adjusted predicted cost with visit	7014 (6644, 7384)	6706 (6360, 7053)	6305 (5981, 6629)
AME	-195 (-657, 268)	-1189 (-1679, -698)	-3015 (-3608, -2422)
Office-based specialist			
Adjusted predicted cost with no visit	6250 (5882, 6617)	6665 (6234, 7096)	8253 (7684, 8822)
Adjusted predicted cost with visit	7798 (7345, 8251)	7312 (6909, 7715)	6708 (6349, 7068)
AME	1549 (1076, 2022)	647 (165, 1129)	-1545 (-2121, -969)
Office-based non-physician provider			

Adjusted predicted cost with no visit	7258 (6886, 7629)	7381 (6998, 7763)	7679 (7281, 8077)
Adjusted predicted cost with visit	6372 (5833, 6911)	6164 (5679, 6648)	5600 (5177, 6023)
AME	-886 (-1456, -316)	-1217 (-1742, -691)	-2079 (-2569, -1589)
Emergency department			
Adjusted predicted cost with no visit	6783 (6449, 7116)	6496 (6170, 6822)	6212 (5893, 6531)
Adjusted predicted cost with visit	13407 (12000, 14814)	14866 (13558, 16174)	14478 (13422, 15534)
AME	6624 (5273, 7975)	8370 (7123, 9617)	8266 (7273, 9259)
Home health care			
Adjusted predicted cost with no visit	7367 (6973, 7762)	7400 (6997, 7802)	7738 (7317, 8159)
Adjusted predicted cost with visit	6030 (5474, 6586)	6066 (5557, 6574)	5402 (4984, 5820)
AME	-1337 (-1985, -689)	-1334 (-1942, -726)	-2336 (-2877, -1795)
Skilled nursing facility			
Adjusted predicted cost with no visit	7336 (6869, 7804)	7370 (6905, 7836)	7351 (6892, 7809)
Adjusted predicted cost with visit	6305 (5489, 7122)	6223 (5424, 7022)	6275 (5496, 7054)
AME	-1031 (-2096, 34)	-1147 (-2189, -106)	-1076 (-2088, -64)

Notes:

(i) In multivariable two-part models, adjusted predicted outcome (APO; in \$), average marginal effect (AME; in \$) and 95% confidence interval (CI) were adjusted for all other explanatory variables listed in Table 2 as well as the variables listed in this table. Adjustment for the twenty most frequent index admission diagnoses was performed for all index admission patients only.

(ii) The AME represents the difference in APO (i.e., 30-day readmission inpatient costs per IA discharge) between patients who did and did not utilize each post-discharge service.

(iii)  $p < 0.05$  if 95% CI does not include zero.